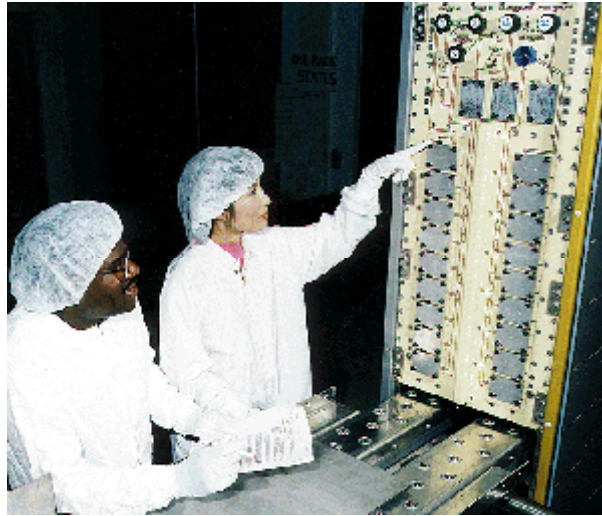


Combustion Module 1: Spacelab Racks Integrated at the Lewis Research Center for the First Time

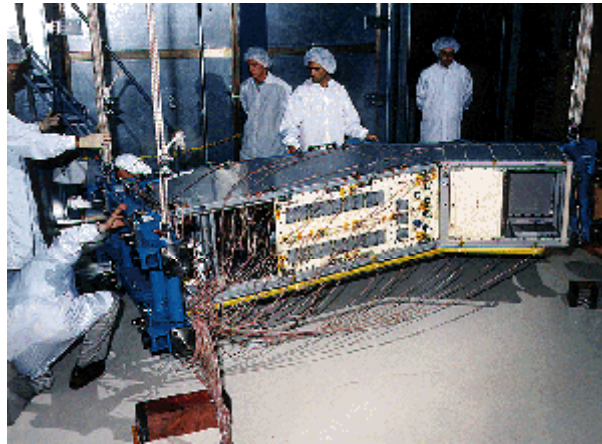


Lewis engineers examine Spacelab rack after package installation.

The Combustion Module-1 (CM-1), NASA's largest (over 1800 lb) and one of the most sophisticated combustion experiments ever to fly on the Spacelab, will be carried on the first Microgravity Science Laboratory (MSL-1) mission aboard the space shuttle flight STS-84 in April 1997. The CM-1 project is a stepping stone to the space station era, because the hardware can support multiple investigators on the same mission and can be integrated at user locations and shipped to the launch site. CM-1 is being developed to accommodate microgravity combustion experiments that are designed to help explain and predict the behavior of combustion processes. Although the two principal investigators for CM-1 are both studying combustion processes, their investigations are quite different. Professor Paul D. Ronney of the University of Southern California will examine the Structures of Flame Balls at Low Lewis Numbers (SOFBALL), in which a variety of fuel-lean gaseous mixtures fill the combustion chamber and are ignited. Professor Gerard M. Faeth of the University of Michigan will investigate Laminar Soot Processes (LSP) by studying the key properties of burning gas jets of fuel, employing different fuels and nozzle sizes.

CM-1's ability to be integrated at user locations is critical in meeting the aggressive schedule for flight on the first Microgravity Science Laboratory. It was necessary to assemble the various hardware packages into the Spacelab racks at the NASA Lewis Research Center in order to fit a shortened development schedule. The normal procedure is to ship the packages separately to the Kennedy Space Center and integrate the packages into the Spacelab racks there. The complexity of the hardware and the requirement to deliver the hardware nearly 18 months quicker than normal for a project of this size led to

the decision for the integration process to take place at Lewis.



Personnel from Lewis, Marshall, and Kennedy prepare for modal test of the CM-1 single rack at the NASA Lewis Research Center.

Lewis management made other decisions to meet the launch date. One of these decisions was to do the design, development, and fabrication in house and to use the resources available at Lewis and the Greater Cleveland area. To date, nearly 40 fabrication shops across Northeastern Ohio have contributed to making the project a reality. The strategy is working, because the project is still on schedule after 2 years.

Another factor in keeping the project on schedule has been the teaming relationships that have developed among personnel from several NASA centers: Headquarters, Marshall Space Flight Center, Kennedy Space Center, Johnson Space Center, and Lewis Research Center. Getting a payload of this size and complexity built and delivered has involved many people from many organizations, all playing their parts and keeping the project moving toward its launch date. The CM-1 project has proved that these new ways of doing business are achievable and that the many organizations across NASA are already changing to make them a reality.